Programme : Bachelor of Science (Second Year)
Subject : Computer Science
Semester : IV
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Paper Title : Computer Organization & Operating Systems
Unit V : Introduction to Operating systems
Module Name : Types of Operating System - Multiprogramming Systems, Batch Systems, Time-Sharing Systems
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Notes

✓ Multiprogramming Systems

- Sharing the processor, when two or more programs reside in memory at the same time, is referred as multiprogramming.
- Multiprogramming assumes a single shared processor. Multiprogramming increases CPU utilization by organizing jobs so that the CPU always has one to execute.
- The operating system keeps several jobs in memory at a time.
- This set of jobs is a subset of the jobs kept in the job pool.
- The operating system picks and begins to execute one of the jobs in the memory.
- This operating systems monitor the state of all active programs and system resources using memory management programs to ensures that the CPU is never idle, unless there are no jobs to process.

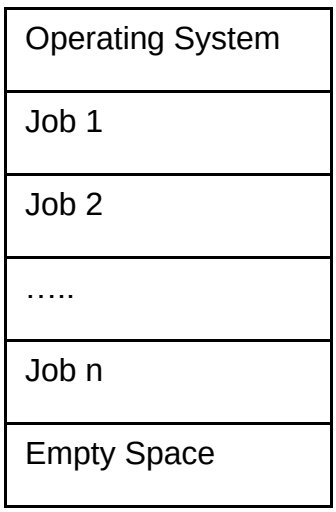

Figure : Memory layout for Multiprogramming Systems

✓ Multiprogramming Systems : Advantages

- High and efficient CPU utilization.

- Resources are utilized smartly.
- Less response time
- Short time jobs are done fastest compare to long time jobs.
- Multiple users can use multiprogramming system at once.
- It can help to execute multiple tasks in single application at same time duration.

✓ **Multiprogramming Systems : Disadvantages**

- CPU scheduling is required.
- To accommodate many jobs in memory, memory management is required.
- If, it contains massive load of jobs then its long time jobs have to need long waiting time.
- Harder task is management of all processes and jobs.

✓ **Batch Systems:**

- The users of a batch operating system do not interact with the computer directly.
- Each user prepares his job on an offline device like punch cards and submits it to the computer operator.
- To speed up processing, jobs with similar needs are batched together and run as a group.
- The programmers leave their programs with the operator and the operator then sorts the programs with similar requirements into batches.

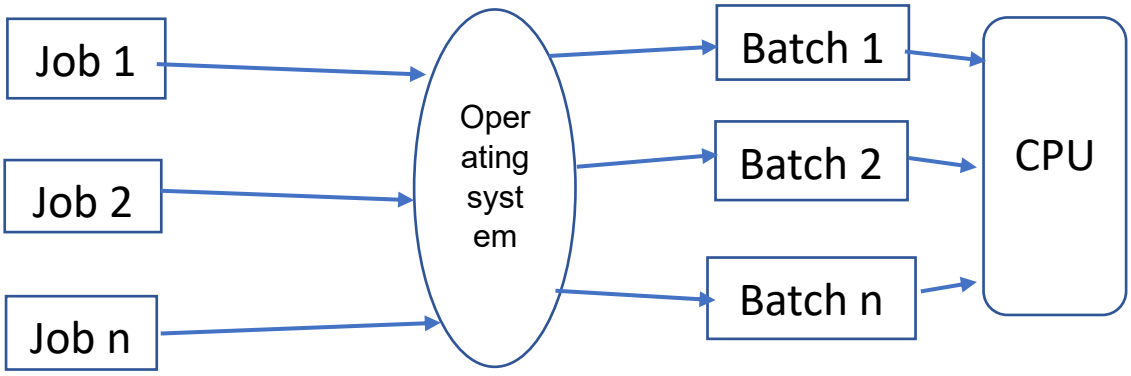

Figure : Batch Systems

- ✓ **Batch System : Advantages**
- ➢ It is very difficult to guess or know the time required for any job to complete. Processors of the batch systems know how long the job would be when it is in queue.
- ➢ Multiple users can share the batch systems
- ➢ The idle time for the batch system is very less
- ➢ It is easy to manage large work repeatedly in batch systems
- ✓ **Batch System : Disadvantages**
- ➢ The computer operators should be well known with batch systems.
- ➢ Batch systems are hard to debug.
- ➢ Non-interactive and It is sometimes costly.
- ➢ The other jobs will have to wait for an unknown time if any job requires large amount of time (Starvation) or if it fails.

- ✓ **Time Sharing Systems**
- ➢ Time-sharing systems enables many people, located at various terminals, to use a particular computer system at the same time.
- ➢ The main objective is to minimize response time.
- ➢ Each task is given some time to execute so that all the tasks work smoothly.
- ➢ Each user gets the time of CPU as they use a single system.
- ➢ These systems are also known as Multitasking Systems.
- ➢ The task can be from a single user or different users also.
- ➢ After this time interval is over OS switches over to the next task.
- ✓ **Time Sharing Systems : Advantages:**
- ➢ Each task gets an equal opportunity
- ➢ Fewer chances of duplication of software
- ➢ CPU idle time can be reduced
- ➢ Provides the advantage of quick response.
- ✓ **Time Sharing Systems : Disadvantages:**
- ➢ Problem of reliability.
- ➢ Question of security and integrity of user programs and data.
- ➢ Problem of data communication.